PB89-153803

Superfund Record of Decision (EPA Region 3)
Chisman Creek Site, Grafton
York County. Virginia, March 1988
Second Remedial Action

(U.S.) Environmental Protection Agency
Washington, DC

31 Mar 88

U.S. Department of Commerce
National Technical Information Service
NTIS

50272-101

REPORT DOCUMENTATION PAGE	1. REPORT NO. EPA/ROD/R03-88/044	2.	3. Recipient's Accession No. PB89 153803/AS
4. Title and Subtitle SUPERFUND RECORD OF DECISION C[illegible]man Creek, VA S[illegible]nd Remedial Action - Final			5. Report Date 03/31/87 6.
7. Author(s)			8. Performing Organization Rept. No.
9. Performing Organization Name and Address			10. Project/Task/Work Unit No. 11. Contract(C) or Grant(G) No. (C) (G)
12. Sponsoring Organization Name and Address U.S. Environmental Protection Agency 401 M Street, S.W. Washington, D.C. 20460			13. Type of Report & Period Covered 800/000 14.

15. Supplementary Notes

16. Abstract (Limit: 200 words)

The Chisman Creek site is located near Grafton in York County, Virginia. This ROD addresses operable unit two, which consists of three ponds (designated A, B, and C), the freshwater tributary, and the Chisman Creek estuary. The site is located within the watershed of Chisman Creek, a tributary of the Chesapeake Bay. Approximately 500 to 1,000 people live witnin one mile of the site. Between 1957 and 1974, fly ash from the V[illegible]rginia Power Yorktown Power Generating Station was disposed of in four abandoned sand [illegible] gravel borrow pits located approximately two miles south of the generating station. The fly ash disposal areas, designated Areas A, B, C, and D, became known as the Chisman Creek Superfund site. Between 1971 and 1973, all fly ash in Area D was removed and deposited in Area C. Area D was reportedly filled with construction rubble generated during the construction of public utilities in the area at that time. After a domestic well showed discolored water in 1980, the Virginia State Water Control Board (SWCB) and Virginia State Board of Health sampled residential ground water in the vicinity of the fly ash areas to determine the types and concentrations of contaminants present. The Virginia Institute of Marine Science and SWCB conducted additional studies to determine the nature and extent of area contamination. The first operable unit ROD was signed in September 1986. The remedial action, begun in November 1987, includes: placing a soil

(See Attached Sheet)

17. Document Analysis a. Descriptors

Record of Decision
Chisman Creek, VA
Second Remedial Action - Final
Contaminated Media: sw
Key Contaminants: metals (arsenic, cadmium, copper, lead, nickel, vanadium)

b. Identifiers/Open-Ended Terms

c. COSATI Field/Group

18. [illegible]ability Statement	19. Security Class (This Report) None	21. No. of Pages 52
	20. Security Class (This Page) None	22. Price

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EPA/ROD/R03-88/044
Chisman Creek, VA
Second Remedial Action - Final

16. ABSTRACT (continued)

cover on two areas and a clay cap on a third area; relocating a portion of the tributary; providing an alternate water supply for residential areas; and post-closure monitoring. At the request of EPA, the U.S. Fish and Wildlife Service conducted the second operable unit remedial investigation to evaluate the impact of contaminants at the site on fish and wildlife resources and their habitat. Chemical analysis of the physical environment and biota of the site for operable unit two focused on eight metals. These were arsenic, cadmium, copper, lead, nickel, selenium, vanadium, and zinc. The most ubiquitous and abundant metals were nickel and vanadium. Bioassays showed the surface water quality in Ponds B and C to be below ARAR levels, and sediment from the Chisman Creek estuary to have no adverse impacts from the contaminants. Fish from the freshwater ponds and oysters from Chisman Creek have not been impacted. Human health risks from consumption of fish and oysters, or accidental ingestion of surface water and sediments are all within EPA guidelines for acceptable risks. The primary contaminants of concern affecting surface water in Area A include nickel and vanadium.

The selected remedial action for this site includes: diversion of surface runoff from Area A (covered with soil in Operable Unit One) into Pond A, and water quality monitoring to evaluate the effectiveness of both operable units. The estimated present worth cost for this remedial action is $137,000.

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March 1988

PB89-153803

EPA

Superfund Record of Decision:

Chisman Creek, VA

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DECLARATION FOR THE RECORD OF DECISION

SITE NAME AND LOCATION

Chisman Creek Superfund Site - Operable Unit Two
Grafton, York County, Virginia

STATEMENT OF PURPOSE

This decision document represents the selected remedial action for this site developed in accordance with CERCLA, as amended by SARA, and to the extent practicable, the National Contingency Plan.

The State of Virginia has concurred on the selected remedy.

STATEMENT OF BASIS

This decision is based upon the administrative record (index attached). The attached index identifies the items which comprise the administrative record upon which the selection of a remedial action is based.

DESCRIPTION OF THE SELECTED REMEDY

Operable Unit Two consists of three ponds (designated A, B, and C), the freshwater tributary, and the Chisman Creek estuary. At the request of EPA, the U.S. Fish and Wildlife Service conducted the Operable Unit Two Remedial Investigation to evaluate the impact of contaminants at the site on fish and wildlife resources and their habitat.

The Record of Decision for Operable Unit One was signed on September 30, 1986 and remedial action began in November, 1987. Specific actions include: placing a soil cover on two areas and a clay cap on a third area; installing a subsurface drain system and treating the ground water; relocating a portion of the tributary; providing an alternate water supply for residential areas; and post closure monitoring. Operable Unit One remedial action is scheduled to be complete in December, 1988.

The selected remedy for Operable Unit Two, Surface Drainage Modification near Pond A, recommends diverting surface runoff from Area A into Pond A which discharges to the freshwater tributary at the outlet of Pond A. This alternative also includes a water quality monitoring program for each of the ponds to evaluate the effectiveness of the remedial measures implemented by Operable Units One and Two.

The No Action alternative was chosen for the tributary and the estuary, however, each alternative includes a water quality monitoring program. The monitoring program for the ponds, the tributary, and the estuary will be further developed during the remedial design and may include, but not be limited to, water quality analysis, sediment quality analysis, and "trigger values" for both water and sediment that will determine the appropriateness of additional bioassays.

DECLARATION

The selected remedies for Operable Units One and Two are protective of human health and the environment, attain Federal and State requirements that are applicable or relevant and appropriate, and are cost-effective. These remedies satisfy the preference for treatment that reduces toxicity, mobility, or volume as a principal element. Finally, it is determined that these remedies utilize permanent solutions and alternative treatment (or resource recovery) technologies to the maximum extent practicable.

3/31/88
Date

James M. Seif
Regional Administrator

Summary of Remedial Alternative Selection
Chisman Creek Superfund Site
Operable Unit Two

INTRODUCTION

The Superfund investigation of the Chisman Creek Site has been separated into Operable Unit One and Operable Unit Two. Operable Unit One consists of four fly ash disposal pits (designated Areas A, B, C, and D) and areal ground water. Operable Unit Two consists of three ponds (designated A, B and C), the freshwater tributary stream that drains the site, and the Chisman Creek estuary. This document presents a summary of the remedial alternative selection for Operable Unit Two.

SITE LOCATION AND DESCRIPTION

The Chisman Creek Superfund Site is located in York County, Virginia, approximately one mile north of Grafton. The site is located within the watershed of Chisman Creek, a tributary of the Chesapeake Bay. The site location is shown on Figure 1.

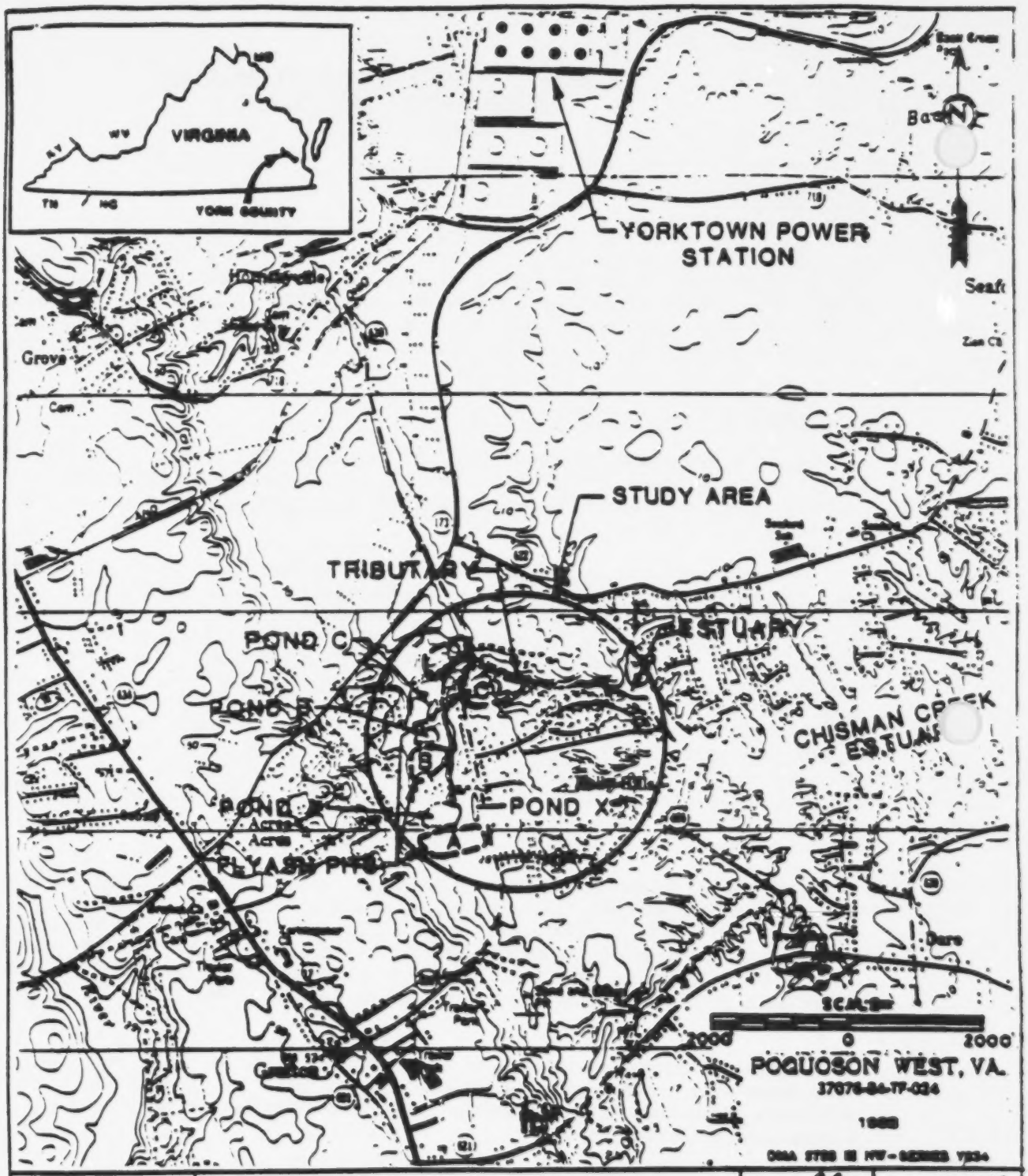
Operable Unit One consists of four abandoned sand and gravel borrow pits that were filled with fly ash generated at the Virginia Power Yorktown Power Generating Station. The fly ash disposal pits are located adjacent to Wolftrap Road (State Route 630), approximately 0.7 miles northeast of the intersection of Route 630 and U.S. Route 17. The southernmost pit, Area A, is approximately 13.5 acres in area and is bordered on the west by the former York County municipal landfill and on the east by Route 630. Area B, approximately 4.5 acres, is 700 feet north of Area A and is bordered on the east and west by intermittent streams. Area C, approximately 12.9 acres, is 500 feet northeast of Area B, and is bordered by Route 630 to the west and by Chisman Creek to the northeast. Area D, approximately 5 acres, is 150 feet northwest of Area C (see Figures 1 and 2). Parts of Areas A and C are elevated between 5 and 20 feet above the surrounding land. The relief of Areas B and D is similar to that of the surrounding land.

Operable Unit Two consists of Ponds A, B, and C, the freshwater tributary stream, and the Chisman Creek estuary, as shown in Figure 2. The ponds are located west of Wolf Trap Road immediately north of area A. The tributary consists of two branches in the area of the ponds as shown, with the confluence of the branches near Pond C. From the confluence of the two branches, the tributary flows eastward under Wolf Trap Road, along the north face of Ash Pit C, and into the Chisman Creek estuary.

In this document it is assumed that remedial action will be performed in accordance with the existing Record of Decision (ROD) for Operable Unit One which addresses the pits. This work began in November 1987 and is scheduled for completion in December 1988.

Specific actions performed under Operable Unit One include:

- Covering Areas A and B with a layer of soil over a layer of soil/fly ash mixture and revegetating;



CONSULTANTS, INC.	SITE LOCATION MAP CHISMAN CREEK SUPERFUND SITE	DWN. RR CHKD. DTS APPD. CDM DATE 11-13-87 SCALE: 1" = 2000' DRAWING NUMBER 87-266-A2 REV
	FIGURE 1	

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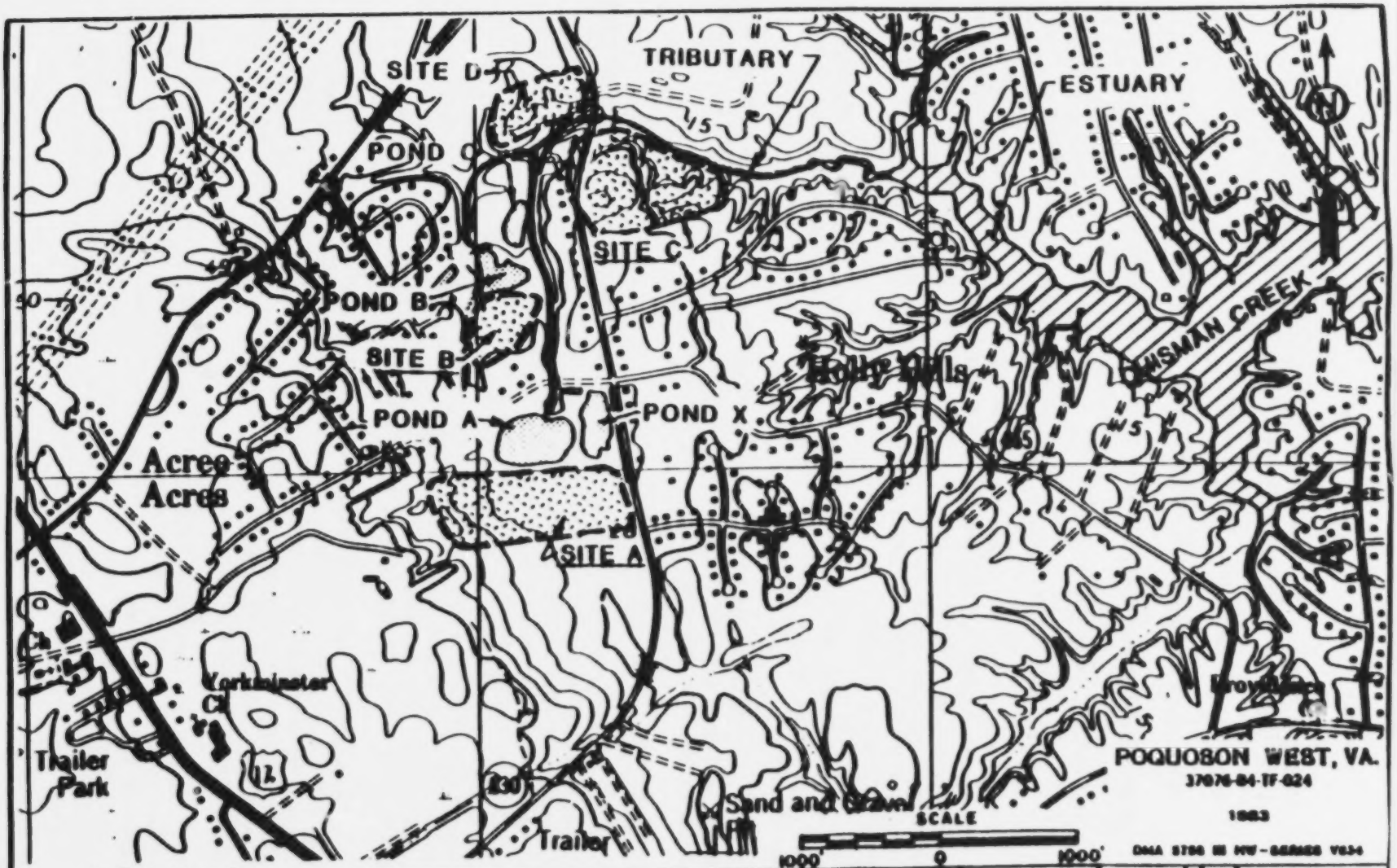
SITE D
TRIBUTARY
ESTUARY
POND C
SITE C
POND B
SITE B
POND A
POND X
CHISMAN CREEK
Acree Acres
SITE A
Yorktaylor Ct
Trailer Park
Trailer
Sand and Gravel
POQUOSON WEST, VA.
37076-84-TF-024
1983
SCALE
1000' 0 1000'
LEGEND
POND
FLYASH PIT
STUDY AREA
CHISMAN CREEK SUPERFUND SITE
FIGURE 2
DWN. RL
CHKD. ZDS
APPD. CDM
DATE 11-12-87
SCALE: 1" = 1000'
DRAWING NUMBER
87-266-A1
REV

- Capping Area C with a low-permeability cover, revegetating, installing subsurface drains, and providing treatment of the collected ground water until the water can be discharged directly to the freshwater tributary;

- Relocating a portion of the tributary along Area C;

- Providing an alternate water supply for residential areas;

- Obtaining deed restrictions; and

- Post-closure monitoring of surface and ground water quality.

The remedial actions taken under the Operable Unit One have been designed to minimize the release of contaminants from the site by controlling various sources of contamination. These acions will significantly improve quality of the environment of the areas studied during Operable Unit Two. The alternatives presented in this document complement the remedial action associated with Operable Unit One.

Approximately 500 to 1,000 people live within 1 mile of the Chisman Creek site. Land use in the immediate vicinity of the site is mainly for single family residences.

Chisman Creek supports private and commercial marinas and numerous private docks, and is a popular fishing area for both private and commercial fishermen. Ponds in the area are reportedly used for recreation as well.

SITE HISTORY

Two units of the Virginia Power Yorktown Power Generating Station began burning coal mixed with petroleum coke in 1957 and 1958. Coke is a dry, combustible material produced by the distillation of oil and petroleum products. Most of the organic constituents of coal and coke are reduced to gases and are exhausted to the atmosphere during combustion. However, solid residues are also produced during the combustion of coal and coke. These residues contain metals and certain inorganic substances which are present in the coal and coke prior to combustion. One of the solid residues produced is fly ash which is removed from the exhaust stream during combustion. Fly ash material was produced at the Yorktown Power Generating Station until 1974, when Virginia Power converted the station to burn fuel.

Between 1957 and 1974, Virginia Power employed a private contractor to haul the fly ash from the Yorktown Power Generating Station. Large quantities of the fly ash were deposited in four abandoned sand and gravel borrow pits located approximately two miles south of the generating station in the Chisman Creek watershed. The four fly ash disposal areas became designated as the Chisman Creek Superfund Site.

Area D was partially filled with fly ash during the same time period as the other pits. However, the owner of Area D reported that all of the fly ash was removed from Area D and deposited in Area C between 1971 and 1973. Area D was reportedly filled with construction rubble generated during the construction of public utilities in the area at that time. Soil samples analyzed from Area D during the Operable Unit One investigation confirmed the removal of the fly ash.

In 1980, a domestic well west of Area C along Wolftrap Road was reported to have discolored water. In November of 1980, the Virginia State Water Control Board (SWCB) and Virginia State Board of Health began sampling ground water from residential wells in the vicinity of the fly ash areas to determine the types and concentrations of contaminants present. Subsequent studies were conducted by the Virginia Institute of Marine Science (VIMS) and the SWCB to determine the nature and extent of contamination in the area. These studies found elevated concentrations of trace metals in ground water, surface water and soil in and adjacent to the fly ash disposal areas. The data and conclusions of these studies resulted in the site being included on the National Priorities List (NPL) by the EPA in 1983.

Following the listing of the site on the NPL, EPA conducted the Operable Unit One Remedial Investigation and Feasibility Study (RI/FS). The Operable Unit One ROD was issued by EPA in September 1986, and a consent decree was signed by Virginia Power and EPA in September 1987. A final Work Plan for Remedial Design/ Remedial Action (RD/RA) was prepared by Virginia Power and construction began in November 1987. Remedial action for Operable Unit One is scheduled for completion in December 1988.

At the request of EPA, the U.S. Fish and Wildlife Service (FWS) conducted the Operable Unit Two RI to evaluate the impact of contaminants at the site on fish and wildlife resources and their habitat. The final RI was submitted to EPA in September 1987. GAI Consultants, Inc. (GAI), a contractor to Virginia Power, prepared the FS for Operable Unit Two and submitted the final FS in January 1988.

Chemical analyses of the physical environment and biota at the site for Operable Unit Two focused on eight metals. These were arsenic, cadmium, copper, lead, nickel, selenium, vanadium and zinc.

No organic contaminants were identified during the Operable Unit One RI that were attributable to the fly ash. The results of the Operable Unit Two RI indicate that the surface water, sediment, fish and aquatic vegetation at the site contain elevated levels of various metals. The most ubiquitous and abundant metals were nickel and vanadium.

Principle findings of the Operable Unit Two investigation are presented below:

- Bioassays were performed by the FWS on water from Ponds A, B, C and the tributary using water fleas and fathead minnows as test organisms. Based upon laboratory bioassay tests, Pond A water and tributary water were observed to exhibit toxic effects to water fleas. Waters from Ponds B and C were not toxic to the water fleas. No toxicity was observed in any of the fathead minnow tests.

- A sediment bioassay from the Chisman Creek estuary indicated a low level of subacute toxicity. This is based on the adverse impacts on osmoregulation and respiration observed in grass shrimp. No adverse impacts were noted at a second location, nor were any impacts noted on a second test organism, the blue mussel, at either location.

- The number of species and the number of individuals per specie in the benthic macrofaunal community of Chisman Creek was essentially the same as that of the control estuary, Bennett Creek. Results indicate that the benthic community of Chisman Creek is not being significantly impacted by contaminants.

- A histological evaluation of fish from the freshwater ponds and oysters from Chisman Creek was conducted to assess the impact of contaminants on site organisms. The examination concluded that neither group's health condition was seriously impacted by contaminants at the site.

- EPA evaluated the human health effects associated with eating fish from the ponds and oysters from the estuary. The data indicates that the consumption of fish and oysters does not present a human health hazard.

- The human health risks associated with the accidental ingestion of surface water and sediments at the site were were found to be within EPA guidelines for acceptable risks.

Section 121 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 U.S.C. Section 9621, provides that remedial action under CERCLA shall, at a minimum, meet any standards, requirements, criteria or limitations under federal environmental statutes and state environmental and facility siting laws which are legally applicable to the hazardous substances or pollutants or contaminants concerned or are relevant and appropriate under the circumstances of the release. Such standards, requirements, criteria or limitations are hereinafter referred to as "ARARs". The ARARs for the remedial action selected for Operable Unit Two of the Chisman Creek Site, described herein, were identified on the basis of the requirements of Section 121(d)(2)(a)(i) et seq. of CERCLA; the Guidance on Feasibility Studies under CERCLA (EPA, June 1985, pp. 5-9 to 5-13); and the National Contingency Plan (NCP) 40 C.F.R. Part 300. Table 1 presents the standards and criteria for the eight metals (arsenic, cadmium, copper, lead, nickel, selenium, vanadium, and zinc) that were the focus of the Operable Unit Two RI and FS.

Table 2 summarizes the exceedance of ARARs for such metals. All exceedances were found in surface water at the site. Table 2 includes the locations and analytical results of the samples and the value of the ARARs that were exceeded.

The preceding table did not list vanadium since vanadium is presently an inorganic for which ARARs have not been promulgated. However, EPA has recently developed an unpublished Estimated Advisory Concentration (EAC) for vanadium. This value is 7.7 Parts per billion (ppb) in freshwater systems. A saltwater EAC has not been established to date.

The Federal Register states: "nonpromulgated advisories and guidance documents issued by federal or state governments do not have the status of potential ARARs." (52 FR 32497, August 27, 1987.) Since the EAC for vanadium is unpublished, the public has not had the opportunity for comment and it appears that this is the first site the EAC for vanadium has been applied. Therefore, comparisons of the Chisman Creek site data with the vanadium EAC must be made with caution.

The following table presents a summary of the results from the Operable Unit Two RI from the analysis of surface water for vanadium.

TABLE 1

CHEMICAL SPECIFIC ARARs FOR CONTAMINANTS AT THE CHISMAN CREEK SITE (IN PPB)

Regulation	Element							
	Arsenic	Cadmium	Copper	Lead	Nickel	Selenium	Vanadium	Zinc
HUMAN HEALTH PROTECTION								
1. SDWA MCL	50	10	-	50	-	10	-	-
2. CWA Fish and Water	0.0022*	10	1000‡	50	13.4*	10	-	5000‡
3. CWA Water Only	0.0025*	10	1000‡	50	15.4*	10	-	5000‡
4. CWA Fish Only	0.0175*	-	-	-	100	-	-	-
5. SDWA MCLG	50	5	1300	20	-	45	-	-
6. Virginia Surface Water	50	10	1000	50	-	10	-	5000
AQUATIC LIFE PROTECTION								
7. CWA Freshwater Acute	360**	3.9+	18+	82+	1400+	20	-	120+
8. CWA Freshwater Chronic	190**	1.1+R	12+	3.2+R	160+	5	-	110+
9. CWA Marine Acute	69**	43	2.9R	140	75	300	-	95
10. CWA Marine Chronic	36**	9.3	2.9R	5.6R	8.3R	71	-	86
11. Virginia Freshwater	190**	3.2+	36.1+	16.8+	250+	35	-	47
12. Virginia Marine	36	9.3	2.9R	5.6	7.1R	54	-	58

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*Risk level of 1 in a million is presented
‡Organoleptic criterion (taste and odor)
**Criterion is for trivalent form of arsenic
+Hardness based criterion, calculated using a value of 100 mg/l
RLower than EPA approved detection limits for element analysis

1. Safe Drinking Water Act, Maximum Contaminant Level.
2. Clean Water Act, criteria based on ingestion of fish and water.
3. Clean Water Act, criteria based on ingestion of water only.
4. Clean Water Act, criteria based on ingestion of fish only.
5. Safe Drinking Water Act, Maximum Contaminant Level Goal.
6. Virginia Surface Water Standard for Public Water Supply.
7. Clean Water Act, criteria for protection of freshwater organisms from acute toxicity effects.
8. Clean Water Act, criteria for protection of freshwater organisms from chronic toxicity effects.
9. Clean Water Act, criteria for protection of marine organisms from acute toxicity effects.
10. Clean Water Act, criteria for protection of marine organisms from chronic toxicity effects.
11. Virginia water quality criteria for surface water, freshwater organisms.
12. Virginia water quality criteria for surface water, marine organisms.

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SUMMARY OF NUMBER OF SAMPLES THAT EXCEED AN ARAR

	Operable Unit 2.					Reference Areas		
	Pond A	Pond B	Pond C	Tributary	Estuary	Hornsley Pond	Beaverdam Creek	Bennett Creek
Nickel	One sample (16 ppb) exceeded 15.4 and 13.4 ppb ARARs	No Exceedances	No Exceedances	Five samples (15-30 ppb) exceeded 13.4 and 15.4 ppb ARARs	Three samples (53-58 ppb) exceeded 7.1 and 8.3 ppb ARARs	No Exceedances	No Exceedances	No Exceedances
Arsenic	No Exceedances	No Exceedances	No Exceedances	No Exceedances	Two samples (71 and 145 ppb) exceeded 36 and 69 ppb ARARs	No Exceedances	No Exceedances	No Exceedances
Zinc	No Exceedances	No Exceedances	No Exceedances	No Exceedances	No Exceedances	No Exceedances	No Exceedances	No Exceedances
Selenium	No Exceedances	No Exceedances	No Exceedances	No Exceedances	No Exceedances	No Exceedances	No Exceedances	No Exceedances
Lead	No Exceedances	No Exceedances	No Exceedances	One sample (9 ppb) exceeded an 8.9 ppb ARAR	Two samples (8.0 and 10.0 ppb) exceeded 5.6 ppb ARAR	No Exceedances	No Exceedances	One sample (55 ppb) exceeded a 5.6 ppb ARAR
Cadmium	No Exceedances	No Exceedances	No Exceedances	No Exceedances	No Exceedances	No Exceedances	No Exceedances	No Exceedances
Copper	No Exceedances	No Exceedances	No Exceedances	No Exceedances	Three samples (39-59 ppb) exceeded a 2.9 ppb ARAR	No Exceedances	No Exceedances	No Exceedances

Table 3

Analysis of Surface Water for Vanadium

Pond A	Pond B	Pond C	Wormley Pond*	Tributary	Beaverdam Creek*
68 ppb	8.4 ppb	None Detected	None Detected	104 ppb	None Detected
75 ppb	None Detected	None Detected	None Detected	368 ppb	None Detected

*Reference Area

The EP toxicity test is presently the only ARAR that has been developed by EPA or the State of Virginia for sediment quality that applies to the metals of concern studied in this investigation. The EP toxicity test is used to determine if a solid substance is a hazardous waste and subject to the Resource Conservation and Recovery Act. CH2M Hill a contractor for EPA, conducted EP toxicity tests on sediments and fly ash from the site during the Operable Unit One investigation. Based on these test results, none of the samples tested, including the ash itself, may be defined as a RCRA hazardous waste.

Remedial Objectives

Based on the guidelines for the selection of remedies in CERCLA Section 121, the NCP, and the previous objectives for Operable Unit One, five remedial action objectives have been developed for Operable Unit Two.

1. Prevent Direct Contact: Prevent human contact with surface water and sediments containing trace elements which are in excess of ARARs or otherwise may adversely affect human health.

2. Prevent Ingestion of Contaminated Surface Water or Sediments: Prevent human consumption of water or sediments containing trace elements which are in excess of ARARs or otherwise may adversely affect human health.

3. Protect Wetlands: Protect environment by preventing or minimizing disruption or destruction of existing wetlands that might result from the implementation of remedial actions at the site.

4. Protect Water and Sediment: Prevent degradation of surface water and sediments to levels that are in excess of ARARs and that may adversely affect human health or the environment.

5. Restore Surface Water Quality: Restore the quality of surface water to levels that attain ARARs or levels that are otherwise necessary to protect human health and the environment.

EVALUATION OF ALTERNATIVES

The remedial alternatives evaluated in the FS are summarized below. A separate group of alternatives is presented for each of the three areas of the Operable Unit Two investigation: the ponds, the freshwater tributary, and the Chisman Creek estuary (see Table 4).

I. Ponds A, B, and C

The surface water quality in Ponds B and C were documented to be below all ARARs and there were no adverse effects observed from the test organisms that were exposed to the surface water from Ponds B and C. Therefore, the remedial action alternatives considered in the Operable Unit Two FS focus primarily on Pond A.

Alternative 1: No Action (Ponds A, B, and C)

The no action alternative is a viable alternative and provides a baseline for comparison to the other alternatives. Alternative 1 includes a water quality monitoring program for each of the three ponds. This program will be designed to determine the effectiveness of the remedial actions associated with the Operable Unit One ROD. The estimated present-worth cost of this alternative is $85,000.

Alternative 2: Fill Pond A

Alternative 2 consists of the complete filling of Pond A. Implementation of this action would involve draining the pond and discharging the water to the tributary; acquiring and placing borrow soil within the dewatered pond; implementation of a surface drainage system to direct the surface water that previously discharged into the pond to the downstream tributary; and a seeding program to establish a long-term vegetative stand on top of the new fill. Alternative 2 includes a water quality monitoring program for Ponds B and C. The estimated presentworth cost of this alternative is $966,000.

Alternative 3: Land Use Restrictions

Alternative 3, land use restrictions, involves installing a six-feet high chain link fence around Pond A to prevent unauthorized access to the water. It also includes obtaining deed restrictions for the property containing Ponds A, B, and C. Deed restrictions for the adjacent areas would be obtained as part of the remedial action associated with the Operable Unit One ROD. These additional restrictions would be intended to prohibit the use of the ponds. Alternative 3 also includes a water quality monitoring program for each of the ponds. This program would be designed to determine the effectiveness of the remedial actions. The estimated present-worth cost of this alternative is $175,000.

Alternative 4: One-Time Treatment of Pond A Water

This alternative involves one-time treatment of Pond A water to lower the concentration of nickel in the pond. A mobile treatment unit would be used to lower the nickel concentration from approximately 16 to about 9 ppb. Water would be pumped to the plant, the nickel removed, and the effluent returned to the pond. The process would continue until the nickel level is reduced below ARARs. This is expected to take less than two weeks of treatment; however, mobilization

time would extend the total time required to implement this option. Alternative 4 also includes a water quality monitoring program for each of the ponds. This program would be designed to determine the effectiveness of the remedial measures. The estimated present-worth cost of this alternative is $538,000.

Alternative 5: Surface Drainage Modifications Near Pond A

This alternative utilizes the technology of the addition of runoff water to Pond A to reduce the concentration of contaminants. The remedial action associated with Operable Unit One requires covering Area A with a soil cover. Alternative 5 suggests diverting the surface runoff from Area A into Pond A, which discharges to the freshwater tributary at the outlet of Pond A. This alternative also includes a water quality monitoring program for each of the ponds to evaluate the effectiveness of the remedial measures. The estimated present-worth cost of this alternative is $137,000.

Alternative 6: Dredge Pond A Sediments

Alternative 6 consists of dredging the sediments from Pond A to remove sediments that may contain ash and trace elements. A hydraulic dredge would be the most appropriate piece of equipment for implementing this alternative. The material collected by the dredge would be dewatered, disposed of on-site, and covered with a soil layer in accordance with the Operable Unit One remediation. Alternative 6 also includes a water quality monitoring program for each of the ponds to evaluate the effectiveness of the remedial measures. The estimated present-worth cost of this alternative is $281,000.

Table 4 summarizes the comparison of the alternatives for the Ponds with respect to technical feasibility; environmental, institutional, and public health considerations; and cost-effectiveness. Table 5 presents a summary of the technical feasibility and specifically addresses the performance, reliability, and implementability of each alternative. A summary of the CERCLA/SARA clean-up standard attainment is presented in Table 6. Table 7 is a final summary presenting a qualitative and quantitative comparison of the alternatives for the Ponds.

II. Freshwater Tributary

Alternative 1: No Action

The No Action alternative is a viable alternative and provides a baseline for comparison to the other alternatives. Alternative 1 includes a stream water quality monitoring program of the freshwater tributary to evaluate the effectiveness of the remedial actions associated with the Operable Unit One ROD. The estimated present-worth cost of this alternative is $75,000.

SUMMARY OF ALTERNATIVES*

Alternative	Technical Feasibility	Environmental Evaluation	Institutional Requirements	Public Health Evaluation	Cost Analysis	
					Capital	Present Worth at 10% Discount Rate
Ponds						
1. No Action	Feasible.	Gradual water quality improvement in A and B after completion of Operable Unit 1 remediation. Pond C not affected.	ARARs achieved now in Ponds B and C. ARARs attained in 1 year in Pond A.	No appreciable carcinogenic or non-carcinogenic risk associated with occasional exposure to the site. (See Table 7).	0	85,000
2. Fill Pond A	Conventional methods can be used.	Aquatic organisms and terrestrial wildlife exposure to trace elements will cease. Elimination of 3 acres of poor to fair open-water wetland habitat. Permission required from property owner.	ARARs will be met for Pond A. No permits for discharge or filling required.	Public health risk equivalent to background risk.	909,000	966,000
3. Land Use Restrictions	Permission required from property owner.	Same as No Action.	Same as No Action.	Casual access risk similar to No Action.	90,000	175,000

*ARARs in this Table refer to contaminant-specific ARARs

TABLE 4

(continued)

SUMMARY OF ALTERNATIVES

Alternative	Technical Feasibility	Environmental Evaluation	Institutional Requirements	Public Health Evaluation	Cost Analysis	
					Capital	Present Worth at 10% Discount Rate
4. One-time Treatment of Pond A Water	Feasible.	Similar to No Action. Equilibrium nickel concentration will be the same as No Action, however, equilibrium will be reached in 7 years.	ARARs will be met in less than 2 weeks after the treatment plant is in place.	Initially, slightly greater risk reduction than No Action and the same as No Action over longterm.	453,000	538,000
5. Surface Drainage Modification for Pond A	Feasible.	Gradual improvement in Pond A water quality. Equilibrium nickel concentration will be reached in 5 years.	ARARs will be met in 4 months.	Very slight risk reduction when compared to No Action.	33,000	137,000
6. Dredge Pond A Sediments	Sediments can be placed on-site.	Short-term destruction of benthic organisms, and release of trace elements to the water. Recovery and time to realize improvements unknown.	ARARs will not be met initially. It may take many years to attain ARARs.	Slightly greater risk reduction than No Action.	196,000	281,000

SUMMARY OF TECHNICAL FEASIBILITY EVALUATION-PONDS *

Remedial Alternative	Criterion			
	Performance		Reliability	
Remedial Alternatives	Effectiveness	Useful Life	Operation and Maintenance (O&M) Requirements	Possible Failure Modes
1. No Action	Will attain ARARs.	Permanent.	Monitoring is recommended in Ponds A, B, and C. Access required.	Off-site contamination sources.
2. Fill Pond A	Will attain ARARs.	Permanent.	No site O&M required after implementation, other than monitoring in Ponds B and C.	Unauthorized excavation of Pond A.
3. Land Use Restrictions	Will attain ARARs and will reduce casual Pond A use.	Useful life of fencing approximately 15 years.	Regular inspection and maintenance of fence required; monitoring recommended in Ponds A, B, C.	Fencing may deteriorate; may be cut, climbed over or dug under.
4. One-Time Treatment of Pond A Water	Will attain ARARs.	Temporary.	Monitoring recommended at Ponds A, B, C.	Possibility the treatment plant can not provide desirable effluent concentration.
5. Surface Drainage Modification - Divert Site A Surface Drainage Through Pond A	Will attain ARARs.	Permanent.	Occasional inspection and maintenance of diversion channels required; monitoring required at Ponds A, B, C.	Possibility of poor quality surface water entering Pond A from off-site.
6. Dredge Sediments From Pond A	Will improve quality of pond bottom material and surface water.	Permanent.	Monitoring recommended at Ponds A, B, C.	Possible incomplete removal of all sediments containing

* ARARs in this Table refer to contaminant-specific ARARs.

(continued)

SUMMARY OF TECHNICAL FEASIBILITY EVALUATION-PONDS

	Implementability			
	Constructability		Time	
	Site Conditions	Conditions External to Site	To Implement	To See Desired Results
1. No Action	No construction required.	No construction required.	Immediate upon completion of Site A remediation.	One year.
2. Fill Pond A	Can be constructed by conventional methods. Continuous pumping required during construction.	Borrow material required to provide approximately 30,000 cubic yards to fill Pond A. Property access required.	Can be implemented in one construction season (3 to 4 months).	Three months.
3. Land Use Restrictions Pond A	Fencing installed by conventional methods.	Property access required.	Can be implemented within one construction season.	One year.
4. One-Time Treatment of Pond A Water	Implemented by using mobile water treatment unit.	Sludge would need to be disposed of in an approved facility. Property access required.	Less than six months.	Two weeks.
5. Surface Drainage Modification	Constructed by conventional methods.	Property access required.	May be implemented in one construction season.	Four months.
6. Dredge Sediments From Pond A	Implemented by conventional methods.	Placement of dredged material on site. Property access required.	May be implemented in one construction season.	Unknown, could be many years

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TABLE 6

ATTAINMENT OF CERCLA CLEANUP GOALS (SECTION 121)*

Location/Alternative	Significant and Permanent Decrease in Toxicity, Mobility, or Volume of Hazardous Substance, Pollutant, or Contaminant	Protection of Human Health and the Environment	Attainment of Applicable or Relevant and Appropriate Requirements (ARARS) Upon Completion of Remedial Action
Ponds			
1. No Action	Mobility of trace elements will be reduced under remediation for Operable Unit 1 (Ash Pits).	Human health and environment will be protected with the reduction of mobility of trace elements.	All ARARs should be attained according to results of water quality modeling.
2. Fill Pond A Completely	Same as No Action; also, mobility of trace elements in sediment will be reduced. Discharge will meet ARARS.	Same as No Action, except Pond A environment will be eliminated.	Same as No Action.
3. Land Use Restrictions	Same as No Action.	Same as No Action; further protection of human health by restriction of pond use.	Same as No Action.
4. One-Time Treatment of Pond A Water	Same as No Action.	Same as No Action.	Same as No Action.
5. Surface Drainage Modification -- Divert Site A Surface Drainage Through Pond A	Same as No Action.	Same as No Action.	Same as No Action.
6. Dredge Sediments From Pond A.	Same as No Action; also, mobility of trace elements in sediment will be reduced.	Same as No Action; the environment of the pond bottom will be adversely impacted.	Same as No Action.

*ARARs in this Table refer to contaminant-specific ARARs

FINAL SUMMARY POND*

Alternative	Persistence, Toxicity Mobility, Bioaccumulation	Short- & Long-Term Potential Adverse Effects from Human Exposure	Long-Term Maintenance Costs
Ponds			
No Action	Fair - Nickel Tied Up in Nickel Sulfide	Medium - Operable Unit 2 Already has Risk Well Below 10^{-7}	Very Low
Fill Pond A	Excellent - All Possible Sediment Movement out of Pond Halted	Low - Prevents Human Contact With Waters and Sediment Containing Trace Elements	Very Low
Access Restriction	Fair - Same as No Action	Medium - Same as No Action	Medium - Fence Needs Periodic Reconstruction
One-Time Treatment	Good - Temporary Reduction in Nickel Levels, Thereby Reducing Possible Toxicity to Organisms	Very Low to Medium - Short Term Better than No Action, Long Term Equal to No Action	Low to Medium - Depending on Type & Amount of Sludge Produced
Surface Drainage Modification	Very Good - Long Term Reduction in Nickel and Vanadium Levels	Very Low - Lower Concentration of Trace Elements in Water Leads to Lower Risk	Low - Occasional Channel Clearing
Dredge Pond A	Fair - Dredging Moves Sediment to Different Environment, Allowing potential Nickel Release from Nickel Sulfide	Low - May Release Nickel From Sediments into Hydrologic System, but Would Prevent Human Contact With Sediments Containing Trace Elements Greater than Those of the Background	Medium - Dredged Spoils Need to be Controlled in Some Facility

*The terms High, Medium, and Low as used in this table are relative, not absolute

TABLE

(Continued)

Alternative	Potential for Future Remedial Action Costs	Potential Threat to Human Health & Environment Associated with Excavation, Transport, Redisposal, Containment	Cost Effectiveness
No Action	Very Low	Very Low	Excellent
Fill Pond A	Very Low	Very Low	Poor
Access Restriction	Very Low	Very Low	Good
One-Time Treatment	Very Low	High - Treatment May Concentrate Trace Elements in a Sludge (Produced from the Process) Which May be a RCRA Hazardous Waste	Fair
Surface Drainage Modification	Very Low	Very Low	Very Good
Dredge Pond A	Very Low	High - Humans will be in Close Proximity to the Sediments During Excavation	Fair

TABLE 7

(Continued)

Alternative	Nickel Concentration in Pond A Water*	Vanadium Concentration in Pond A Water**	Permanence	Potential for Habitat Improvement	Potential to Achieve ARARS *	Pond A Carcinogenic Risk Level (nickel in sediment)	Pond A Carcinogenic Risk Level (nickel in water)	Pond A Carcinogenic Risk Level (arsenic in sediment)	Pond A Carcinogenic Risk Level (arsenic in water)
No Action	Very Good (9 ppb)	Good (21 ppb)	Not Applicable	Fair	Good	10^{-8}	10^{-13}	10^{-10}	10^{-13}
Fill Pond A	Not Applicable	Not Applicable	Excellent	Very Poor	Good	0	0	0	0
Access Restriction	Very Good (9 ppb)	Good (21 ppb)	Poor - fence may be broken	Fair	Good	$<10^{-8}$	$<10^{-13}$	$<10^{-10}$	$<10^{-13}$
One-Time Treatment	Very Good (9 ppb long-term, 5 ppb short-term)	Not Applicable***	Fair	Good	Very Good	$<10^{-8}$	10^{-14} (short term) $<10^{-13}$ (long term)	Not Evaluated	Not Evaluated
Surface Drainage Modification	Excellent (4 ppb)	Excellent (9 ppb)	Very Good	Excellent	Excellent	$<10^{-8}$	10^{-13}	Not Evaluated	$<10^{-13}$
Dredge Pond A	Very Good (Should be <9 ppb)	Very Good Should be <21 ppb)	Good	Poor	Good	$<10^{-8}$	$<10^{-13}$	$<10^{-10}$	$<10^{-13}$

*Based on material balance model after implementation; initial concentration = 16 ppb; most stringent ARAR = 13.4 ppb.
**Based on material balance model after implementation; initial concentration = 72 ppb; no ARARs available for vanadium.
***Available practicable technologies cannot lower existing vanadium level in the pond.

*contaminant-specific ARARs

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Alternative 2: Tributary Relocation

Alternative 2 consists of relocating approximately 2100 feet of the freshwater tributary that is located adjacent to Area C and filling in the old reach. The purpose of this alternative is to rechannel the surface water drainage from the Chisman Creek site so that it is no longer exposed to tributary sediments that may contain inorganics above background levels.

Implementation of this action would include the excavation of a new channel and establishment of vegetation on the banks of the relocated stream. The relocated channel would be constructed similar to the existing channel in terms of length, meander ratio, channel dimensions and slopes, bed particle size, and bank vegetation. Alternative 2 also includes a water quality monitoring program in the tributary to evaluate the effectiveness of the remedial measures. The estimated present-worth cost of this alternative is $164,000.

Alternative 3: Dredge Tributary

Alternative 3 consists of dredging the sediments from the freshwater tributary located adjacent to Area C (approximately 2100 feet) in order to remove sediments containing inorganics above background. Hand-held dredging equipment may be used to remove sediments from the tributary. The collected material would be dewatered, disposed on site, and ultimately covered with a layer of soil in accordance with Operable Unit One remediation. Alternative 3 also includes a water quality monitoring program for the tributary to evaluate the effectiveness of the proposed remedial measures. The estimated present-worth cost of this alternative is $127,000.

Table 8 summarizes the comparison of the alternatives for the freshwater tributary with respect to technical feasibility; environmental, institutional, and public health considerations; and cost-effectiveness. Table 9 presents a summary of the technical feasibility and specifically addresses the performance, reliability, and implementability of each alternative. A summary of the CERCLA cleanup standards attained is presented in Table 10. Table 11 is a final summary presenting a qualitative and quantitative comparison of the alternatives for the freshwater tributary.

III. Chisman Creek Estuary

Alternative 1: No Action

The No Action alternative is a viable alternative and provides a baseline for comparison to the other alternative. Alternative 1 includes a water quality monitoring program of the estuary to evaluate the effectiveness of the remedial actions associated with the Operable Unit One ROD. The estimated present-worth cost of this alternative is $170,000.

SUMMARY OF ALTERNATIVES *

Alternative	Technical Feasibility	Environmental Evaluation	Institutional Requirements	Public Health Evaluation	Cost Analysis: Capital	Cost Analysis: Present Worth at 10% Discount Rate
Tributary						
1. No Action	Feasible	Water quality in tributary will improve after Operable Unit 1 is remediated.	ARARs will be met after Site C of Operable Unit 1 is remediated.	No appreciable carcinogenic or non-carcinogenic risk associated with occasional exposure to the site.	0	75,000
2. Relocate Tributary	Feasible.	Wetland wildlife and fish habitat values will be reduced for several years; aquatic life in existing stream may be lost; FWS has requested that no action beyond the previously conducted stream relocation be undertaken.	ARARs will be met after Site C of Operable Unit 1 is remediated.	Very slight health risk should approach background.	81,000	164,000
3. Dredge Tributary	Feasible.	Most aquatic life will be removed in affected reach; vegetation will be disturbed; adverse effects could last several years.	ARARs will be met after Site C of Operable Unit 1 is remediated.	Very slight risk should approach background.	44,000	127,000

*ARARs in this Table refer to contaminant-specific ARARs.

TABLE 9

SUMMARY OF TECHNICAL FEASIBILITY EVALUATION
CHISMAN CREEK TRIBUTARY*

Remedial Alternative	Criterion			
	Performance		Reliability	
Remedial Alternatives	Effectiveness	Useful Life	Operation and Maintenance (O&M) Requirements	Possible Failure Modes
1. No Action	Will attain ARARs.	Permanent.	Monitoring recommended in tributary.	Off-site contamination sources.
2. Relocate Tributary	Will attain ARARs.	Permanent.	Monitoring recommended in tributary.	Possible migration of channel to former location.
3. Dredge Tributary	Will improve quality of water and stream bottom.	Permanent.	Monitoring recommended in tributary.	Possible incomplete removal of sediments containing trace elements.

*ARARs in this Table refer to contaminant-specific ARARs.

TABLE 9

(Continued)

SUMMARY OF TECHNICAL FEASIBILITY EVALUATION
CHISMAN CREEK TRIBUTARY

	Implementability			
	Constructability		Time	
	Site Conditions	Conditions External to Site	To Implement	To See Desired Results
1. No Action	No construction required.	No construction required.	None.	Immediate Upon completion of Operable Unit One remediation
2. Relocate Tributary	Can be constructed by conventional methods, however, wetlands may require special methods.	Topography prevents construction upstream of Wolftrap Road bridge.	Can be implemented in one construction season.	Immediately upon completion of construction.
3. Dredge Tributary	Can be implemented by conventional dredging methods in open areas; may require additional effort in wetland areas.	Placement of sediments on-site must be coordinated with pit remediation.	May be implemented in one construction season.	Immediately upon completion of dredging.

TABLE 18

Location/Alternative	ATTAINMENT OF CERCLA CLEANUP STANDARDS (SECTION 121)		
	Significant and Permanent Decrease in Toxicity, Mobility, or Volume of Hazardous Substance, Pollutant, or Contaminant	Protection of Human Health and the Environment	Attainment of Applicable or Relevant and Appropriate Requirements (ARARS) Upon Completion of Remedial Action
Tributary			
1. No Action	Mobility of trace elements will be reduced under remediation for Operable Unit 1 (Ash Pits).	Human health and the environment will be protected with the reduction of mobility of trace elements.	All ARARs should be attained.
2. Relocate Tributary	Same as No Action; also, mobility of trace elements in sediment will be reduced.	Slightly greater protection to human health than No Action; however, environment within relocated reach will be temporarily disturbed until re-established in new reach.	Same as No Action.
3. Dredge Tributary	Same as No Action; also, mobility of trace elements in sediment will be reduced.	Slightly greater protection to human health than No Action; however, environment within dredged reach will be adversely impacted.	Same as No Action.

TABLE 11 FINAL SUMMARY TRIBUTARY*

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Alternative	Persistence, Toxicity Mobility, Bioaccumulation	Short- & Long-Term Potential Adverse Effects from Human Exposure	Long-Term Maintenance Costs
Tributary			
No Action	Operable Units One remediation will reduce mobility and bioaccumulation.	Low - Operable Unit 2 already has risk well below 10^{-4}	Very low
Relocate Stream	Depends on effectiveness of Operable Unit I Remediation. This alternative may further reduce mobility and bioaccumulation.	Low - Would prevent human contact with with sediments containing trace elements at concentrations greater than background	Very low
Dredge Stream	Depends on effectiveness of Operable Unit I Remediation. However, this alternative may increase mobility and bioaccumulation.	Low - May release trace elements from sediments into hydrologic system, but would prevent human contact with sediments containing trace elements at concentrations greater than background	Very low

	Potential for Future Remedial Action Costs	Potential Threat to Human Health & Environment Associated with Excavation, Transport, Redisposal, Containment	Cost Effectiveness
No Action	Very low	Very low	Very good
Relocate Stream	Very low	Very low	Poor
Dredge Stream	Very low	High - Humans will be in close proximity to the sediments during dredging	Fair

	Permanence	Potential for Habitat Improvement	Potential to Achieve ARARS**	Carcinogenic Risk Level (nickel in sediment)	Carcinogenic Risk Level (nickel in water)	Carcinogenic Risk Level (arsenic in sediment)	Carcinogenic Risk Level (arsenic in water)
No Action	Fair	Fair	Good	10^{-10}	10^{-12}	10^{-10}	10^{-10}
Relocate Stream	Very good	Poor	Good	$<10^{-10}$	10^{-12}	$<10^{-10}$	10^{-10}
Dredge Stream	Good	Poor	Good	$<10^{-10}$	10^{-12}	$<10^{-10}$	10^{-10}

*The terms very low, high, poor fair, good, and very good are relative, not absolute.
**contaminant-specific ARARs.

Alternative 2: Dredge Sediments

Alternative 2 consists of dredging approximately 6.7 acres of the Chisman Creek estuary in order to remove sediments containing elevated levels of inorganics. Sediment removal operations in this area, while technically feasi would be complex. Water depths in the affected part of the estuary range from a few inches in the upstream area to a few feet in the most downstream location.

Conventional barge-mounted dredging operations would thus be impractical, unless an access channel was also dredged. Portable truck- or pontoon-mounted hydraulic dredges would be most appropriate. Mechanical dredges may be required where access is limited, the water depth too shallow, or water supply for slurry operations insufficient. Access roads for ingress and egress to the estuary and hauling of dredged spoils would have an adverse impact on adjacent areas.

Disposal would be via hopper trucks, supplemented by small barges where the draft is sufficient. Due to the large volume of dredged material, off-site disposal would be necessary. Two general sites are possible for off-site disposal. The Craney Island disposal site, located at Port of Hampton Roads, has accepted dredged materials of similar composition in the past. Ocean disposal may also be permissible, assuming that the materials are found to meet the criteria for this type of disposal.

Alternative 2 also includes a water quality monitoring program for the Chisman Creek estuary to evaluate the effectiveness of the proposed remedial measures. The estimated present-worth cost of this alternative is $3,000,000.

Table 12 summarizes the comparison of the alternatives for the Chisman Creek estuary with respect to technical feasibility; environmental, institutional, and public health considerations; and cost-effectiveness. Table 13 presents a summary of the technical feasibility and specifically addresses the performance, reliability, and implementability of each alternative. A summary of the CERCLA cleanup standards attainment is presented in Table 14. Table 15 is a final summary presenting a qualitative comparison of the alternatives for the Chisman Creek estuary.

RECOMMENDED ALTERNATIVE

After careful consideration of the proposed remedial alternatives and in accordance with Section 121 of CERCLA, 42 USC Section 9621, and the National Contingency Plan (NCP), 50 Fed. Reg. 47912, November 20, 1985 (codified at 40 CFR Part 300), the recommended alternative for the ponds is Alternative 5, Surface Drainage Modification Near Pond A. The recommended alternative for the freshwater tributary is Alternative 1, No Action, and the recommended alternative for the Chisman Creek estuary is Alternative 1, No action.

SUMMARY OF ALTERNATIVES*

Alternative	Technical Feasibility	Environmental Evaluation	Institutional Requirements	Public Health Evaluation	Cost Analysis	
					Capital	Present Worth at 10% Discount Rate
Estuary						
1. No Action	Feasible.	The water quality in the freshwater tributary will improve after Operable Unit 1 is remediated; other sources of trace elements in the estuary will remain.	ARARs will be met in the freshwater tributary. ARARs in estuary may be met, depending on amounts of trace elements derived from other sources.	Human consumption of fish and oysters does not present a health hazard.	0	170,000
2. Dredge Sediments	Dredging the estuary would be a difficult and complex operation, requiring construction of access roads and channels, and disposal of an extensive quantity of sediment at a remote location.	Dredging and access channel construction will remove benthic communities in affected area, and would take several years to re-establish; re-suspension of trace elements from sediments is likely during dredging; ecosystem of salt marshes will be adversely affected by physical changes; construction of access road would adversely affect the near shore environment.	ARARs will be met in the freshwater tributary. ARARs in estuary may be met depending on amounts of trace elements derived from other sources.	Significant change in total risk not likely.	2,838,000	3,008,000

*ARARs in this Table refer to contaminant specific ARARs.

SUMMARY OF TECHNICAL FEASIBILITY EVALUATION
CHISMAN CRE[illegible] ESTUARY

Remedial Alternative	Criterion			
	Performance		Reliability	
Remedial Alternatives	Effectiveness	Useful Life	Operation and Maintenance (O&M) Requirements	Possible Failure Modes
1. No Action	Quality of water and sediment will improve after Pits A, B, C are remediated.	Permanent.	Monitoring recommended in tributary.	Other contamination sources.
2. Dredge Sediments	Will improve quality of water and sediment.	Permanent.	Monitoring recommended in tributary.	Possible incomplete removal of sediments containing trace elements and other contamination sources.

-22-

	Implementability			
	Constructability		Time	
	Site Conditions	Conditions External to Site	To Implement	To See Desired Results
1. No Action	No construction required.	No construction required.	Immediate.	Unknown, due to other trace element sources.
2. Dredge Sediments	Will require mechanical or hydraulic dredges, and possibly an excavated channel. Roads would also be necessary.	Off-site disposal of sediments required due to volume. Possible institutional constraints.	May be implemented in one construction season.	Unknown, due to other trace element sources.

TABLE 14

ATTAINMENT OF CERCLA CLEANUP STANDARDS (SECTION 121)*

Location/Alternative	Significant and Permanent Decrease in Toxicity, Mobility, or Volume of Hazardous Substance, Pollutant, or Contaminant	Protection of Human Health and the Environment	Attainment of Applicable or Relevant and Appropriate Requirements (ARARS) Upon Completion of Remedial Action
Estuary			
1. No Action	Mobility of trace elements will be reduced under remediation for Operable Unit 1 (Ash Pits).	Human health and the environment will be protected with the reduction of mobility of trace elements.	ARARs will be attained assuming no off-site sources of trace elements.
2. Dredge Sediments	Same as No Action; also, long-term mobility of trace elements in sediment may be further reduced, short-term mobility of trace elements will be increased.	Human health will be protected by the reduction of mobility of trace elements, however, the environment of the estuary bottom wil be significantly distrubed.	Same as No Action.

*ARARs within this Table refer to contaminant-specific ARARs.

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Alternative	Persistence, Toxicity Mobility, Bioaccumulation	Short- & Long-Term Potential Adverse Effects from Human Exposure	Long-Term Maintenance Costs
Estuary			
No Action	Operable Unit One remediation will reduce mobility and bioaccumulation.	Low - Operable Unit 2 already has risk well below 10^{-7}	Very low
Dredge Estuary Sediments	Depends on effectiveness of Operable Unit 1 Remediation. Additionally, this alternative may increase short-term mobility and bioaccumulation.	low - May release trace elements from sediments into hydrologic system, but would prevent human contact with sediments containing trace elements at concentrations greater than background	Very low

Alternative	Potential for Future Remedial Action Costs	Potential Threat to Human Health & Environment Associated with Excavation, Transport, Redisposal, Containment	Cost Effectiveness
No Action	Very low	Very low	Good
Dredge Estuary Sediments	Very low	High - Humans will be in close proximity to the sediments during dredging	Very poor

	Permanence	Potential for Habitat Improvement	Potential to Achieve ARARS	Carcinogenic Risk Level (nickel in sediment)	Carcinogenic Risk Level (nickel in water)	Carcinogenic Risk Level (arsenic in sediment)	Carcinogenic Risk Level (arsenic in water)
No Action	Fair	Fair	Good	10^{-6} to 10^{-5}	10^{-6} to 10^{-5}	10^{-6} to 10^{-5}	10^{-6} to 10^{-5}
Dredge Estuary Sediments	Good	Very poor	Good	10^{-6} to 10^{-5}	10^{-6} to 10^{-5}	10^{-6} to 10^{-5}	10^{-6} to 10^{-5}

*Very Low, High, Very Poor, Fair and Good are relative, not absolute.

Rationale for Recommendation

Ponds A, B, and C

Alternative 5, the Surface Drainage Modification Near Pond A, was judged to be preferable to the other alternatives proposed in the FS for the following reasons:

- EPA evaluated the human health effects associated with eating fish from the ponds. The data indicates that the consumption of fish from the ponds does not present a human health hazard.

- The human health risks associated with the accidental ingestion of water or sediment while swimming in the ponds were found to be within EPA guidelines for acceptable risks.

- A histological evaluation of fish from the ponds concluded that the health condition of the fish was not seriously impacted by contaminants at the site.

- By diverting surface runoff from Area A into Pond A, concentrations of inorganics in Pond A will significantly decrease. Water quality modeling has predicted Alternative 5 will achieve the lowest equilibrium concentration of nickel and vanadium. Within five years nickel is predicted to decrease from 16 ppb to 4 ppb and vanadium should be reduced from 72 ppb to 9 ppb (see figures 3 and 4).

- Surface drainage modifications may be implemented with essentially no adverse impacts to the environment during construction.

- Erosion of fly ash from Area A into Pond A will be eliminated by the capping and revegetation of Area A as required by the Operable Unit One ROD.

- Alternative 5 in conjunction with the remedial action associated with the Operable Unit One ROD, will provide an improved wetland habitat for the freshwater fish, other aquatic fauna, floating and rooted vegetation, and other organisms that inhabit Pond A.

- Alternative 1, No Action, was not chosen because Alternative 5 is more protective of the environment. Alternative 5 will lower the concentration of vanadium to approximately 10 ppb, less than half of the concentration achieved by No Action.

- Alternative 2, Filling Pond A, poses the greatest environmental impact since it would eliminate 3 acres of open-water wetland habitat.

- Alternative 3, Land Use Restrictions, will not reduce the amount of inorganics present in Pond A, nor were there any compelling human health concerns that warrant restricting site access.

- Alternative 4, One-time Treatment of Pond 4 water, was not selected because available practicable treatment methods will not reduce the vanadium concentration below their present levels in Pond A.

- Alternative 5 will meet all ARARs (see Table 16).

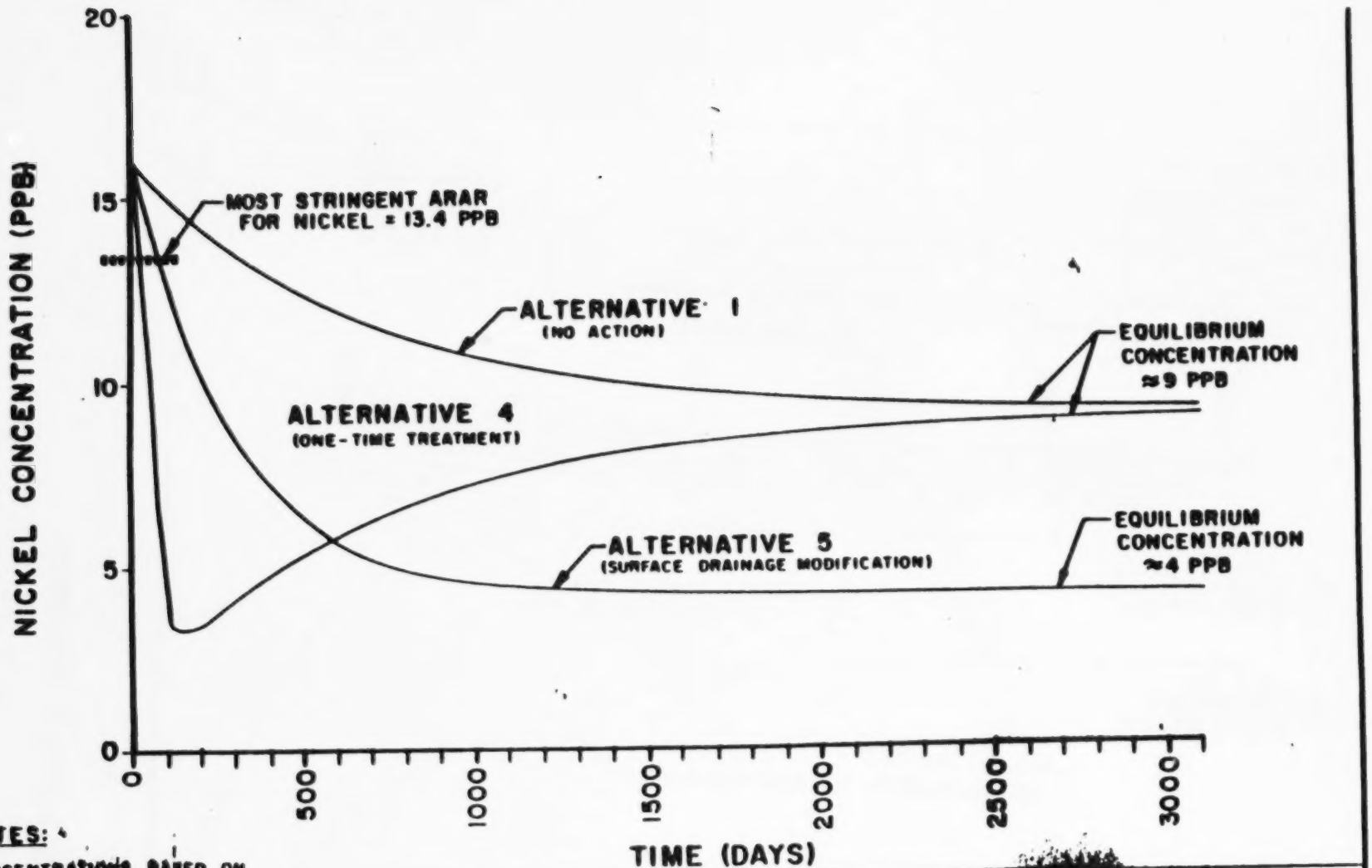
- Alternative 6, Dredging Pond A, will have a significant short-term impact on the water quality due to the resuspension of inorganics. Additionally, dredging would have a severe impact on the benthic community of Pond A.

TABLE 16

ACTION AND LOCATION-SPECIFIC
ARAR Requirements for Selected Remedial Alternative*

Activity	ARAR Citation	Requirement
Activity within a flood plain	Executive Order 11988, Protection of Flood (40 C.F.R. Part 6, Appendix A).	Take action to avoid adverse effects, minimize potential harm, restore and preserve natural and beneficial values
Activity in a wetland	Executive Order 11990, Protection of Wetlands (40 C.F.R. Part 6, App. A).	Take action to minimize the destruction, loss or degradation of wetlands.
Activity affecting a stream or river	Fish & Wildlife coordination Act, 16 U.S.C. Section 661 et. seq.; 40 C.F.R. Section 302.	Take action to protect fish or wildlife
Discharge of pollutants into water of the United States through a point source	Clean Water Act, 33 U.S.C. Section 402(a)(1) 40 C.F.R. Section 122	Meet effluent limitations based on best professional judgement.

*Contaminant-specific ARARs for the selected Remedial Alternative are identified in Table 1.



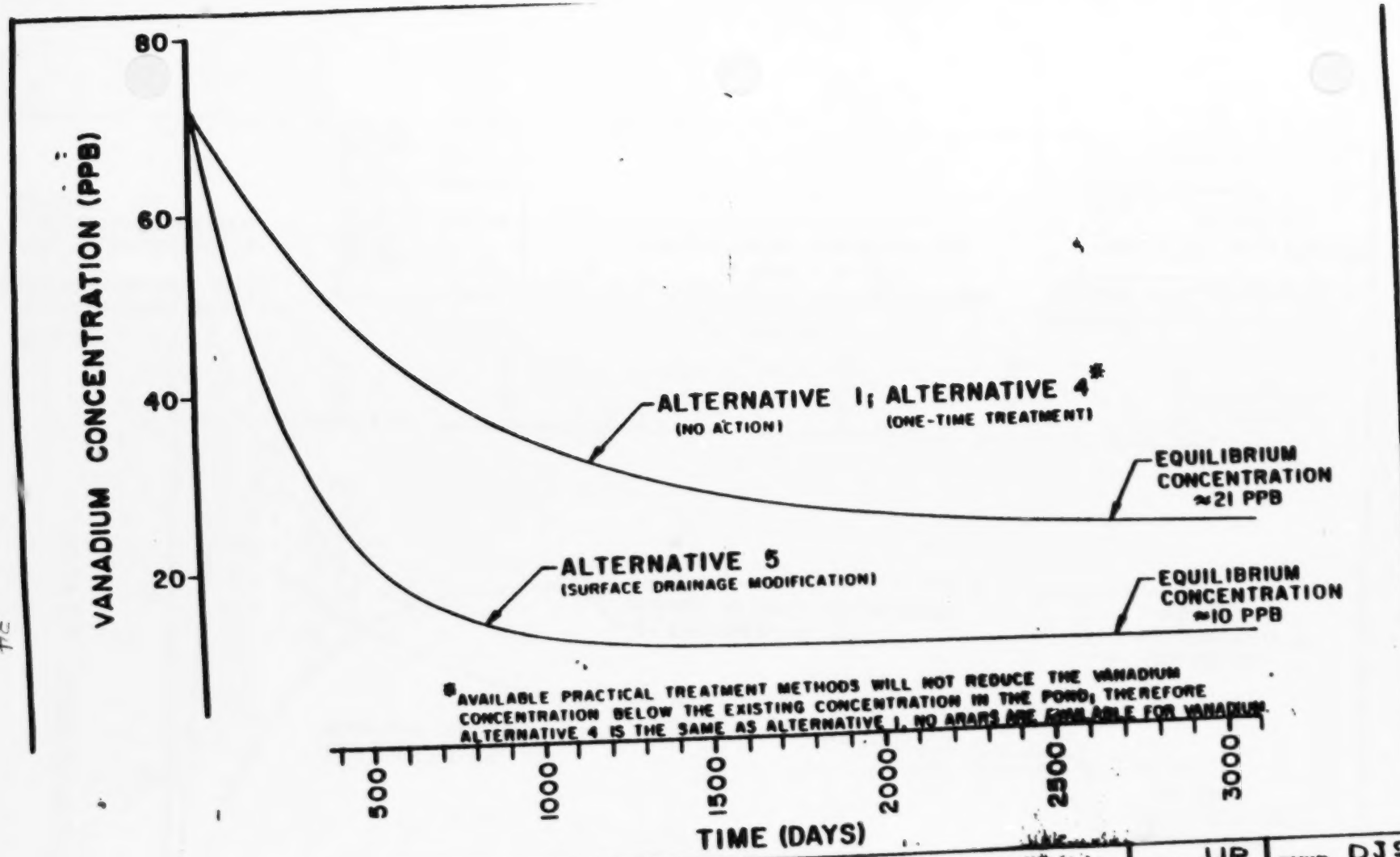
NOTES:

1. CONCENTRATIONS BASED ON MATERIAL BALANCE MODEL.
2. TIME "0" ASSUMED TO BE COMPLETION OF REMEDIAL ACTION.

PREDICTED NICKEL CONCENTRATIONS
IN POND A WATER
CHISMAN CREEK SUPERFUND SITE

FIGURE 3

DWN. NP CHKD. DJS
APPD. CDM DATE 1-22-88
SCALE: AS NOTED
DRAWING NUMBER
87-266-A13



COMBUSTANTS, INC. Engineers • Geologists • Planners Environmental Specialists 680 Beatty Rd • Pittsburgh Monroeville, Pa 15146 412 856 9466	PREDICTED VANADIUM CONCENTRATIONS IN POND A WATER CHISMAN CREEK SUPERFUND SITE	DWN. JJP	CHKD. DJS
		APPD. CDM	DATE 1-22-88
		SCALE: AS NOTED	
	FIGURE 4	DRAWING NUMBER 87-266-A14	H

Freshwater Tributary

Alternative 1, No Action, was judged to be preferable to the other alternatives proposed in the FS for the following reasons:

- The human health risks associated with the accidental ingestion of water or sediment of the freshwater tributary were found to be within EPA guidelines for acceptable risks.

- Prior to the tributary relocation, fly ash was directly eroded from Area C and into the tributary. The relocation of the tributary that has been completed and the capping of Area C will eliminate any additional fly ash from being directly supplied to the tributary.

- The ground water treatment and the capping of Area C associated with the Operable Unit One ROD should allow ARARs for nickel and lead to be met and vanadium concentrations to be significantly reduced in the tributary.

- Concentrations of inorganics that will exist in the surface water and sediments after the remediation associated with the Operable Unit One ROD cannot be precisely quantified; however, the concentration of inorganics should be fully acceptable for the protection of human health and the environment. As previously discussed, the No Action alternative includes periodic water quality monitoring of the tributary in order to quantify the concentration of inorganics present after the remediation associated with the Operable Unit One ROD. In addition, a comprehensive sampling program is being conducted by EPA during the present remedial action at the site. If elevated concentrations of inorganics are determined to exist during or after remediation, any actions needed to further protect public health and the environment will be taken.

- Alternative 2, Tributary Relocation was not selected since 900 feet of the 2100 feet proposed for relocation in Alternative 2 has recently been completed as part of the remediation for Operable Unit One. The Fish and Wildlife Service has requested that no further actions be undertaken in the tributary. EPA agrees that further relocation activities are unnecessary and would disturb the fragile wetland which is presently recovering from the initial remedial action.

- Alternative 3, Dredge Tributary, was not selected because dredging tributary sediments will have a significant short-term impact on the water quality due to the resuspension of inorganics. Additionally, dredging would have a severe impact on the benthic community in the tributary.

Chisman Creek Estuary

- Alternative 1, No Action, was judged to be preferable to the other alternative proposed in the FS for the following reasons:

- EPA evaluated the human health effects associated with eating oysters from the Chisman Creek estuary. The data indicate that the consumption of oysters from the estuary does not present a human health hazard.

- The human health risks associated with the accidental ingestion of water or sediment from the estuary were found to be within EPA guidelines for acceptable risks.

- A histological evaluation of oysters from the estuary concluded that the health condition of the oysters was not seriously impacted by contaminants at the site.

- The number of species and the number of individuals in the benthic macrofounal community of Chisman Creek was essentially the same as that of the control estuary, Bennett Creek.

- It is expected that the estuary water quality will improve after Area C remediation has been completed, as both the quality of the tributary water is improved and the sediment load containing inorganics is eliminated.

- Alternative 2, Dredge Estuary Sediments, was not selected because approximately two acres of high quality salt marsh would be extensively disturbed by dredging activities. Additionally, resuspension of trace elements would occur during dredging, possibly causing impacts on downgradient areas that are presently not affected and dredging would have a severe impact on the benthic community.

The No Action alternative includes periodic monitoring of water quality in the uppermost portion of the estuary. As previously discussed, if elevated concentrations of inorganics are determined to exist after the remediation associated with the Operable Unit One ROD, appropriate measures will be taken.

The monitoring program for the ponds, the tributary, and the estuary will be further developed during the remedial design and may include, but not be limited to, water quality analysis, sediment quality analysis, and "trigger values" for both water and sediment that will determine the appropriate of additional bioassays.

Each recommended alternative for the ponds, the tributary, and the estuary, is protective of human health and the environment, is cost effective, and utilizes permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. The combination of remedies for Operable Units One and Two satisfy the preference for treatment that reduces toxicity, mobility, or volume as a principal element.

CHISMAN CREEK SUPERFUND SITE
GRAFTON, YORK COUNTY, VIRGINIA

RESPONSIVENESS SUMMARY

MARCH 1988

This community relations responsiveness summary is divided into the following sections:

Section I. Overview. This section discusses EPA's preferred remedial action alternative for Operable Unit 2 and public comments on this alternative.

Section II. Background of Community Involvement and Concerns. This section briefly describes the history of community interest and concerns that arose during remedial planning activities at the Chisman Creek site.

Section III. Summary of Major Comments Received During the Public Comment Period and EPA's Responses to these Comments. Comments received are summarized and categorized according to topics.

Section IV. Remaining Concerns. All remaining concerns that EPA or the State of Virginia should be aware of during future remedial activities for this site are discussed in this section.

In addition to the above sections, Attachment A provides a list of the community relations activities EPA has conducted at the site to this date.

I. OVERVIEW

The Chisman Creek site consists of four fly ash disposal areas, three man-made ponds, a fresh-water tributary stream that drains the site and flows into Chisman Creek, and the Chisman Creek estuary. EPA has divided the site into two operable units to facilitate study of and action at the site. Operable Unit 1 consists of the four fly ash disposal areas and area ground water. A remedial investigation and feasibility study (RI/FS) for Operable Unit 1 were performed and a Record of Decision (ROD) was issued by EPA in September 1986. Operable Unit 2 consists of the three ponds, the freshwater stream, and the Chisman Creek estuary. This responsiveness summary focuses on the preferences of and concerns raised by the community in regard to the remedy for Operable Unit 2, as recommended in the feasibility study and proposed plan.

A short site history, as well as the feasibility study findings and a description of the cleanup options have been provided previously in the ROD. The preferred alternatives for Operable Unit 2 consist of surface drainage modification near Pond A, and no action other than monitoring at the other ponds, the fresh water tributary, and the Chisman Creek estuary. In general, the site community has expressed support for the preferred alternative for Operable Unit 2 recommended by EPA.

II. BACKGROUND OF COMMUNITY INVOLVEMENT AND CONCERNS

Several community groups have been involved at the Chisman Creek site since it was placed on the National Priorities List in 1983. That involvement has been coordinated by the York County government and the Chesapeake Bay Foundation and has grown to include many environmental and academic institutions. EPA's community relations effort began with a public meeting to discuss the RI/FS workplan for Operable Unit 1 in April 1984 and has continued with door-to-door visits, small group meetings, and additional public meetings. A public comment period on the FS for Operable Unit 2 was held from February 16 to March 22, 1988. A public meeting on the FS for Operable Unit 2 was held March 15, 1988. The level of concern and interest in the site has varied, as demonstrated by attendance at public meetings for the site. The public meeting on the RI for Operable Unit 1 in December 1985 drew 120 residents; the meeting on the Operable Unit 1 FS drew approximately 40 people. Attendance was somewhat lower for public meetings on Operable Unit 2. The meetings on the ecological study results in July 1987 and the FS in March 1988 had 30 attendees each.

The primary emphasis of the community has been, and continues to be, on protecting the ground water, which is threatened by the site, and improving the overall quality of Chisman Creek. There is also interest in ensuring that the site is handled in a manner consistent with its planned recreational use after remedial action there is complete.

III. SUMMARY OF MAJOR COMMENTS RECEIVED DURING THE PUBLIC COMMENT PERIOD AND EPA'S RESPONSES TO THESE COMMENTS

Comments on the proposed alternative for Operable Unit 2 received at the public meeting on March 15, 1988 and during the public comment period can be grouped into four categories:

- Scope of the remedial investigation
- Remedial options for Pond A
- Remedial option for the Chisman Creek estuary
- Monitoring and maintenance.

A summary of the comments and EPA's responses to them is provided below.

A. Scope of the Remedial Investigation

Commentor: Why wasn't Pond X studied during the remedial investigation?

Response: There has been no indication that Pond X which is next to Wolftrap Road and set back from the site, has been affected by erosion of fly ash.

Commentor: There is another pond on the other side of Wolftrap Road; why wasn't it studied?

Response: It is not likely that this pond was affected by fly ash.

B. Remedial Options

Commentor: Why would filling in Pond A result in the loss of wetlands?

Response: Pond A covers approximately three acres. Fish and turtles populate it and migrating water fowl use it as well. Filling the pond in would then result in the loss of three acres of an open wetland environment. This is why EPA is not proposing this remedy.

Commentor: Will the proposed remedy for Pond A require that pumps will be operating at the site in the future?

Response: No. Water will be collected through swales, which are similar to drainage ditches. There will not be any pumps at the site.

Commentor: A resident who identified himself as a professional engineer expressed doubt that the Chismon Creek cleanup was being conducted properly. He suggested clean up options be better justified.

Response: EPA believes the RI/FS has formed a solid basis for choosing a clean up alternative addressing contamination of Chisman Creek, on-site ponds and streams.

C. Remedial Action for the Chisman Creek Estuary

Commentor: How did EPA come up with the figure of a six-acre area required for dredging?

Response: The six-acre figure was determined as a result of the remedial investigation sampling.

D. Monitoring and Maintenance

Commentor: What will the frequency of sampling and monitoring be?

Response: The monitoring plan will be worked out during remedial design. It will probably be somewhat flexible, based on the results of the sampling during the first few years.

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IV. REMAINING CONCERNS

Local residents express one primary concern in regard to Operable Unit 2 that should be addressed in the future, as appropriate: they would like to be kept informed of the details of the monitoring plan that will be worked out during remedial design. Once the monitoring is in place, the results should be communicated to the public periodically, perhaps through the County government or one of the local organized groups.

APPENDIX A

- April 23, 1984 -- EPA held a public meeting on the workplan for the RI/FS for Operable Unit 1.
- September 10-13, 1984 -- EPA visited residents and distributed a fact sheet which explained future plans for the site.
- December, 1985 -- EPA issued a press release on the RI for Operable Unit 1.
- December, 1985 -- EPA held a Public meeting on the remedial investigation.
- August 25, 1986 -- Local officials and residents were contacted regarding the release of the feasibility study for Operable Unit 1.
- August 26, 1986 -- The FS for Operable Unit 1 was distributed to 4 information centers in the community. A press release was also issued.
- September 11, 1986 -- EPA met with the Stewardship Committee.
- September 15, 1986 -- The comment period was extended to September 24.
- September 22, 1986 -- EPA held a public meeting on the FS for Operable Unit 1.
- July 1, 1987 -- EPA and the U.S. Fish and Wildlife Service held a public meeting to discuss the ecological study.
- March 15, 1988 -- Public meeting on the feasibility study for Operable Unit 2.

Administrative Record Index not included.